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ABSTRACT

While the open oceans remain relatively unpolluted, many coastal areas are suffering from oil, sewage, industrial wastes, and agricultural run-off. This document presents some of the key facts related to these kinds of water pollution. It focuses on the major sources of contamination in the world's seas, and provides an overview of how these pollutants reach the oceans. A major portion of the brief summarizes what the United Nations Environment Programme (UNEP) is doing, beginning with the UN Conference on the Human Environment in 1972, and focusing on the development of regional action plans. It discusses the ocean monitoring activities of several international organizations and describes some of the actions taken to protect marine mammals. The document also provides a status report of the ten regional seas programs now in existence through UNEP. These programs focus upon: (1) the Mediterranean; (2) the Kuwait region; (3) the Wider Caribbean; (4) West and Central Africa; (5) Eastern Africa; (6) East Asia; (7) the Red Sea and the Gulf of Aden; (8) the South Pacific; (9) the South-east Pacific; and (10) South Asia. (TW)

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cleaning up the seas

While the open ocean remains relatively unpolluted, many coastal areas are choking in oil, sewage, industrial wastes and agricultural run-off. UNEP is tackling pollution problems on a regional basis, helping preserve the seas' living resources, and working towards the time when wastes can be safely disposed of at sea, and the state of the world's oceans can be regularly and accurately monitored.

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The pollution of the oceans

Most of the world's waste ends up in the sea. Effluents from factories, farms and homes is dumped first into drains. From there, it flows– often untreated– into streams and rivers. The final step to the sea may take hours or months but the rubbish that finally spews out into the ocean– about 20 billion tonnes of it a year– moves but slowly. Most contaminants remain for years in coastal waters– and an estimated 90 percent of them never reach deep water. Instead, they stay close to shore, where they interfere with the most productive breeding grounds of fish and pollute even the fairest beaches.

For these reasons, the deep oceans are not thought yet to be seriously polluted– even though materials such as radioactive rubbish and toxic wastes are deliberately released into the sea or burned in mid-ocean. Coastal areas, by contrast, are already seriously polluted– from the Atlantic to the Pacific, and from the Caribbean to the Mediterranean.

The commonest evidence of this is the filth in which tourists are now condemned to swim on their favourite beaches. Sewage is often in abundant evidence. So are the diseases that accompany it. In 1973, many people in Naples, Italy, died from cholera poisoning, probably as a result of eating contaminated mussels. In the 1950s, thousands of Japanese were poisoned by mercury released by industry into tidal estuaries.

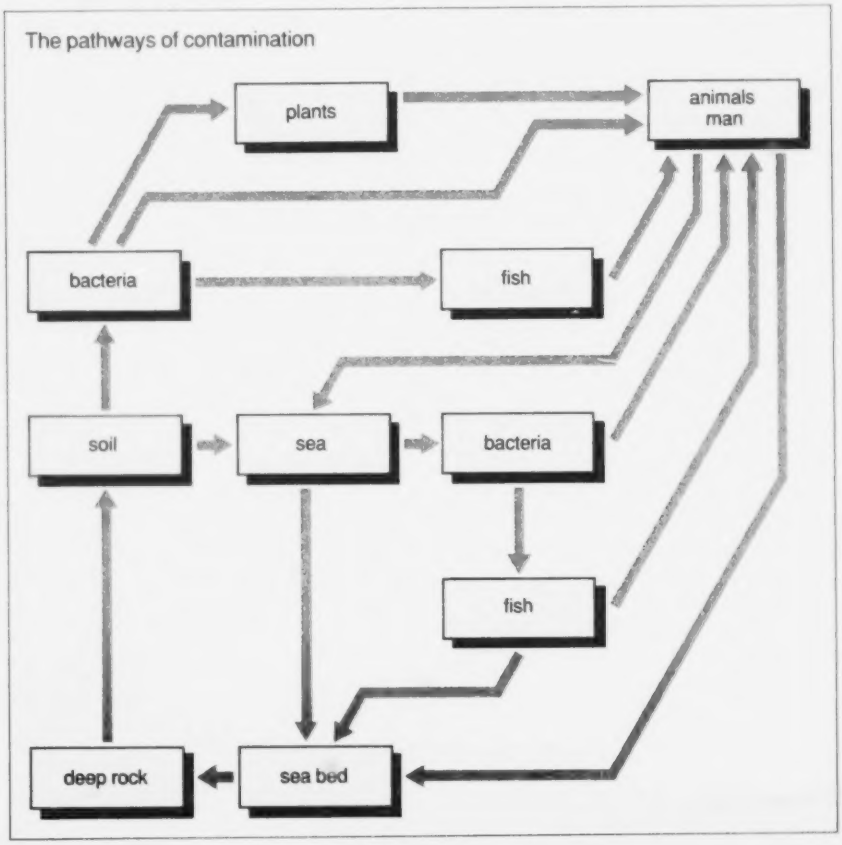
But it is not only tourists who suffer. More than two-thirds of the world's population live within 80 km of a coast, and nearly half of the world's major cities are built on or near an estuary. These facts are one reason why coastal waters have become so badly polluted. They are also one of the reasons why it matters so much: those who depend on the sea inevitably suffer when its quality deteriorates. For fishermen, things are particularly serious. Most of the world's 20,000 varieties of fish and 30,000 types of molluscs come from coastal waters. Worldwide, 90 percent of the fish catch is taken near the shore. Pollution is threatening that catch– which provides much of the world's badly needed animal protein. Sludge from sewers has ruined many of the best shellfish beds in the United States, and in 1969 it was estimated that 70 percent of the fish kills on the shores of that country were caused either by industrial waste or agricultural runoff that had been discharged into the sea.

> ***"Since time immemorial the seas have been humanity's main garbage dump ... over 30 countries get more than a third of their animal protein from seafood."***
>
> **Gunnar Kullenberg**
> **Chairman, GESAMP Working Group on Health of the Oceans**

About four-fifths of the pollution that enters the oceans comes from the land– mainly in the form of sewage, industrial waste and agricultural runoff. The other one-fifth comes from coastal mining, energy production and ocean-going vessels, much of it in the form of oil that is leaked, spilled, or shipwrecked. Tar balls and oil slicks can be found along most of the major shipping routes, even in mid-ocean; sometimes, levels of heavy metals in sea water are also higher along these routes. According to one estimate, between 0.05 and 0.1 percent of the sea's surface is covered with an oil film at any one time. While oil pollution has yet to leave any permanent scar on ocean ecology, wrecks such as those of the *Torrey Canyon*, the *Amoco Cadiz* and the *Ixtoc* have caused the deaths of thousands of sea birds, ruined many beaches and produced serious– if temporary– damage to oyster, mussel and other on-shore fishing operations.

All these effects tend to be worse in semi-enclosed seas such as the Baltic, the North Sea, the Mediterranean and the Gulf of Mexico. The average molecule of Mediterranean sea water, for example, tends to swill round for 80 years before escaping through the Straits of Gibraltar to the Atlantic. This means that the Mediterranean has a very limited ability to clean itself; it is still one of the world's dirtiest seas.

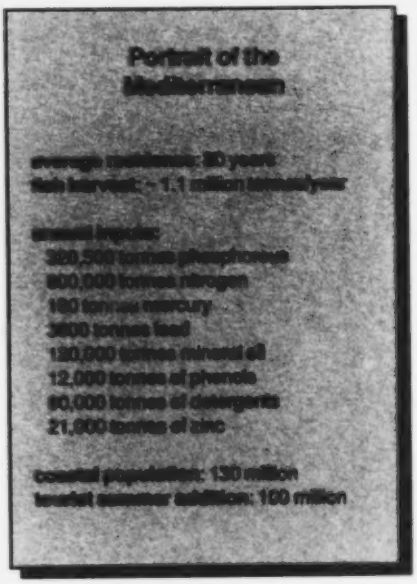
Pollution is also known to have reduced the populations of marine mammals in some ecological hot spots in the North and the Baltic Seas. Elsewhere in the world, certain marine ecosystems– notably



mangrove swamps and coral reefs– have proved particularly vulnerable to some forms of pollution.

In its 1982 report called *The health of the oceans*, the Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) identified a number of areas of potential and increasing concern. These included public health risks from micro-organisms and radioactive wastes, the toxic effects on man and other organisms of new chemicals and heavy metals, alteration of natural habitats as a result of energy production, and increased turbidity and disturbance of the sea bed from deep-sea mining. In addition, rising levels of carbon dioxide, produced mainly as fossil fuels are burnt, are now thought likely to lead to a warmer climate and rising sea levels sometime during the next century.

The GESAMP report, in effect, sounded the alarm on coastal pollution. It pointed out that although the threat was not in itself global, the combined effect of many local forms of pollution could become serious first on a regional and later on a global scale. The



open sea, the main body of the ocean system, remains relatively healthy– but this does not mean that its extremities, such as estuaries and shallow waters, can be neglected. "Our warning," said the Chairman of the group investigating ocean pollution, "was that deterioration there, if allowed to progress, might affect the whole body."

How the seas are contaminated

MAJOR SOURCES OF CONTAMINATION	Baltic	North Sea	Mediterranean	Kuwait Action Plan Region	West African areas	South African areas	Indian Ocean region	South-east Asian region	Japanese coastal waters	North American areas	Caribbean Sea	South-west Atlantic region	South-east Pacific region	Australian areas	New Zealand coastal waters
sewage	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
petroleum hydrocarbons (maritime transport)	●	●	●	●	●	●	●	●	●	●	●	●			
petroleum hydrocarbons (exploration and exploitation)		●		●	●			●		●	●				
petrochemical industry		●	●	●	●		●	●	●	●	●				
mining		●	●					●		●			●	●	
radioactive wastes		●								●					
food and beverage processing	●	●	●		●	●	●	●	●	●	●	●	●	●	●
metal industries		●	●	●	●	●	●	●	●	●	●	●	●		●
chemical industries	●	●	●	●		●	●	●	●	●	●		●	●	
pulp and paper manufacture	●				●			●	●	●			●	●	●
agricultural runoff (pesticides and fertilizer)	●		●		●		●	●	●	●	●	●			●
siltation from agriculture and coastal development					●	●	●	●			●				
sea-salt extraction				●			●				●				
thermal effluents	●	●	●	●		●	●		●	●	●	●		●	
dumping of sewage and dredge		●							●	●					

What UNEP is doing

Action on ocean pollution was one of the priority areas identified by the UN Conference on the Human Environment in 1972. Since then, UNEP has been running a three-part programme aimed at controlling coastal pollution on a regional basis, monitoring the global ocean environment and protecting marine life. UNEP's Oceans and Coastal Areas Programme Activity Centre is responsible for all three areas.

The Stockholm Conference was actually the first body to recommend a regional approach to coastal pollution. Work began with the heavily polluted Mediterranean, and the Mediterranean Action Plan was adopted in Barcelona in February 1975. Today 17 states (plus the EEC) are party to the Plan. As a result, research and monitoring are now organized on a regional basis, and more than 80 national centres participate. Pollution levels have been reviewed twice, plans layed for the socio-economic development of the Mediterranean basin and mechanisms set up to deal with pollution emergencies. Some 40 projects have been completed or are underway.

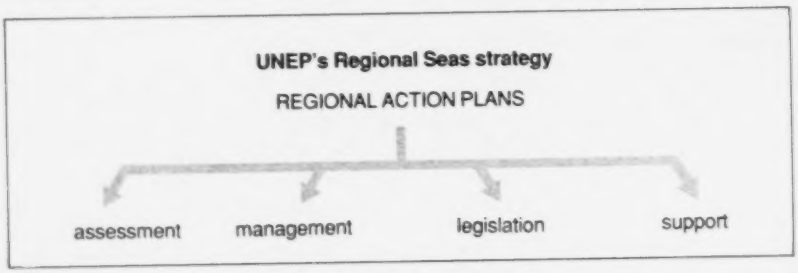
The regional seas programme is based on the idea that the events that cause pollution–not marine pollution itself– are the real problem. Hence the 10 priority targets set in the Mediterranean for 1986-95 include such items as combating soil erosion and forest fires, and reducing air pollution.

There are now 10 regional seas programmes, involving 130 states, 16 UN agencies and more than 40 other international and regional organizations, all working with UNEP to improve the marine environment and make better use of its resources. In some regions, mutually hostile nations have sat down at the same table, time and time again, in order to thresh out their marine problems together.

No two regional programmes are alike: each area has its unique problems, and each needs different solutions. In the Mediterranean, the main jobs were halting pollution and protecting the tourist industry. The Kuwait Plan was mainly concerned with oil pollution. In the Caribbean, West Africa and the South Pacific, participating nations looked for sound development plans that would not destroy their marine environments.

In each case, UNEP sees its role as a catalyst, in which it provides or finds sufficient seed money to bring a regional programme into existence, and then allows participating countries–through their regional secretariats– to take over as soon as is feasible.

UNEP's Regional Seas strategy



The Regional Seas

1. Mediterranean
2. Kuwait Action Plan Region
3. Wider Caribbean
4. West and Central Africa
5. Eastern Africa
6. East Asian Seas
7. Red Sea and Gulf of Aden
8. South Pacific
9. South-east Pacific
10. South Asian Seas

Watching the oceans

Keeping an eye on the global marine environment is another of UNEP's ocean briefs. While some of this work is done through the regional seas programme, separate activities are aimed at assessing the present state of global marine pollution, formulating guidelines for assessing and controlling pollution, and helping coordinate marine pollution research and monitoring.

GESAMP is the body charged with assessing global ocean pollution. Though financed mainly by UNEP, it is a joint project of the United Nations and seven of its agencies (IMO, FAO, UNESCO, WMO, WHO, IAEA and UNEP). So far, GESAMP has carried out ten evaluation reports on different aspects of ocean pollution; a further five, including a major assessment of the state of the marine environment due for completion in 1989, are in the pipeline. Some 600 experts have participated in GESAMP studies, which include the preparation of guidelines designed, for example, to help developing countries select waste disposal sites at sea and assess how much pollution rivers carry into the oceans.

UNEP itself has also prepared a report on marine pollution for the UN General Assembly, and is currently studying the relationship between marine water quality and communicable diseases. One of the major goals for the future is to standardize methods of measuring marine pollution so that results from different sites can be made comparable, and an improved global network set up. A major global monitoring programme is currently under investigation by UNEP and the International Oceanographic Commission: the mussel watch.

The UN Conference on the Human Environment recommended the setting up of a global 'Earthwatch' some 15 years ago. Most of that system, in the form of UNEP's Global Environment Monitoring System (GEMS), is now operational. The one major gap still to be filled is the accurate and regular monitoring of the open oceans. Filling that gap is one of UNEP's main ocean-related targets for the 1990s.

The mussel watch

Mussels may hold one of the main keys to the monitoring of ocean pollutants. Because of their ability to concentrate many of these pollutants, they can provide a good indicator of the state of coastal waters. Unlike fish, mussels are easily collected and do not move. A network of marine laboratories currently collects mussel samples on a regular basis as part of a global 'mussel watch'.

Protecting marine mammals

Some of the world's strangest and most attractive mammals live in the sea: the whales and dolphins, sea cows and seals, sea lions and polar bears. Many of these species are under serious threat from human activity– some are being poisoned by pollution, some over-fished, some hunted to destruction, and some wantonly clubbed to death.

Public reaction to these events has been shrill and horrified. One result is that many countries and organizations have made attempts to protect all or some of the marine mammals: the United States, for example, has a Marine Mammal Protection Act, the International Whaling Commission used to set quotas on kills before the total ban came into effect in 1982, and Australia has a Whale Protection Act.

However good the intentions of individual countries and organizations, action by them alone is not enough: coordinated international action is essential. For this reason, in 1978 the United Nations Food and Agriculture Organization (FAO) and UNEP began work on a Global Action Plan for the Conservation, Management and Utilization of Marine Mammals. The plan was endorsed by UNEP's Governing Council in 1984. It includes 38 recommendations on such diverse subjects as sanctuaries, prohibition of access to breeding areas, the setting of catch limits, and many other matters designed to coordinate all the interests of those concerned with the conservation of marine mammals.

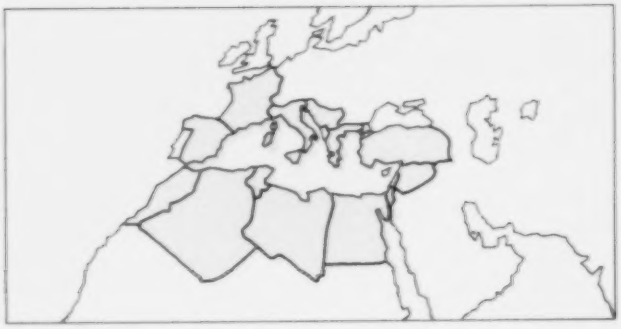
the Galapagos sea lion

UNEP has taken the lead responsibility for implementing the plan, using its Oceans and Coastal Areas Programme Activity Centre to do so. One of the centre's major goals for 1990 is to implement all the major components of the plan in cooperation with other international agencies, national governments, and regional and national organizations.

Regional seas: a global round-up

These two pages summarize the current state of the ten regional seas programmes now in existence. These ten programmes involve130 nations and have received some US $82 million– about US $26 million from UNEP, the rest from other donors and trust funds set up by the participating nations.

1 The Mediterranean

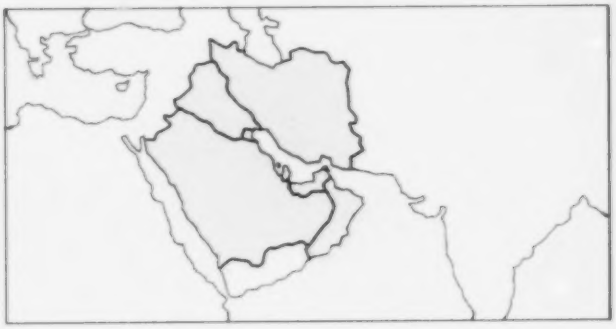


The first of the Regional Seas programmes, on which work started in 1974. The coastal population of the Mediterranean is at least 100 million, and the sea is bordered by 120 cities. Some 80 percent of the waste that enters the Mediterranean is untreated or inadequately processed.

The action plan was adopted in 1975, and was followed a year later by the Barcelona Convention and two Protocols: the convention pledges nations to protect their sea from pollution, and the protocols deal with dumping from ships and aircraft, and cooperation in pollution emergencies.

A third protocol, against pollution from land-based sources, was signed in 1980 and is expected to cost participating countries US $10-15 billion over the next 15 years, mainly in fitting anti-pollution devices in factories, inspection and the installation of pipes to take sewage out of the range of bathers and breeding shell-fish. A 1982 protocol on protected areas is expected to expand the number of local protected areas from about 15 to nearly 100.

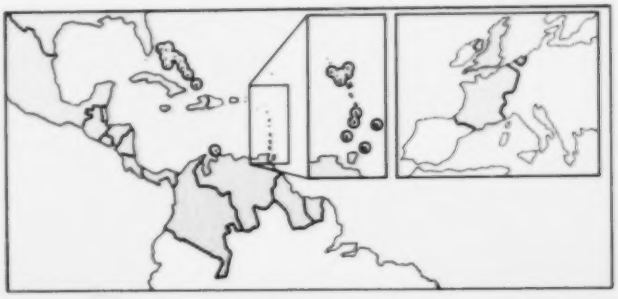
2 Kuwait region



The waters of the Kuwait region are shallow and nearly land-locked. Pollution, particularly from oil, lingers on. Two-thirds of the world's oil passes through these waters.

Eight governments in the region adopted an action plan and a convention in 1978. The programme has its own secretariat in Kuwait which helps organize an ambitious programme covering cooperation in oil pollution, industrial waste, sewage, fisheries and the environmental impact of coastal engineering and mining. A Marine Emergency Mutual Aid Centre has been established in Bahrain.

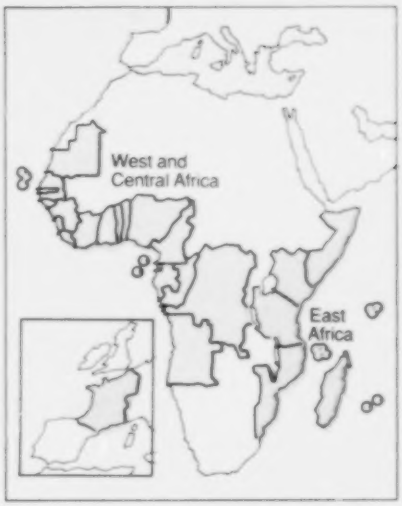
3 The Wider Caribbean



The Caribbean regional programme has posed special problems because the area includes more than 30 potential participants, varying from small island territories to nations such as France and the United States. The action plan, adopted in 1981, set out 66 projects, of which those on watersheds, oil spills and public awareness were given top priority.

4 West and Central Africa

Twenty-one countries– from Namibia to Mauritania– are affected by the 1981 action plan. The convention and a protocol concerning cooperation in combatting pollution in emergencies were adopted at the same time. The major problems are coastal erosion, oil pollution, industrial waste, sewage and agricultural run-off. Initial projects concentrated on building up knowledge of coastal erosion problems, monitoring marine pollution, establishing a network of marine pollution research centres, and setting up national plans for dealing with marine pollution in emergencies.



5 Eastern Africa

The action plan was adopted in 1985. The convention and two protocols, dealing with protected areas and cooperation during pollution emergencies, were adopted at the same time. Preliminary work connected with the action plan produced a good assessment on the state of coastal ecosystems in the region. The area is notable for its coral reefs and mangrove swamps, which provide a living for many fishermen, a breeding ground for many species, and a home for several marine mammals.

6 East Asia

One of the most diverse of the regional seas areas; the action plan was five years in the making and was adopted by the five countries of the ASEAN region– Indonesia, Malaysia, the Philippines, Singapore and Thailand– in 1981. The way was left open, however, for other countries in the region to participate later. For this reason, all legislative action was postponed. Initial projects concern basic studies, oil pollution, industrial waste, monitoring and a study of the effects of pollution on coral reefs and their fisheries.

7 Red Sea, Gulf of Aden

The second oldest plan, approved in 1976 by all coastal states of the region. Still relatively undeveloped, the Red Sea coasts may soon be threatened by mineral mining. The first action plan evolved into the Red Sea and Gulf of Aden Environment Programme, and a second action plan, which is unique in the stress it puts on conservation, was adopted in 1982.

8 South Pacific

In 1982, 21 states and territories adopted an action plan and signed a 14-point declaration on natural resources and the environment. Since then, the South Pacific plan has evolved into one of the most active regional seas programmes, with the island states as the programme's most ardent supporters. Despite political controversy surrounding nuclear testing, the plan has achieved some notable successes. In November 1986, most states in the region approved a new treaty in which they pledged themselves to "prevent, reduce and control pollution from any source".

9 South-east Pacific

Five countries– Chile, Colombia, Ecuador, Panama and Peru– adopted the action plan in 1981, which was accompanied by a convention and a protocol dealing with pollution emergencies. A protocol on combating pollution from land-based sources has now also been adopted. This is one of the few areas in the world where oil pollution is not the major problem; food processing wastes, city sewage and mineral pollution in major ports are all ranked more important. The area covered is large, ranging from tropical to sub-Antarctican ecologies.

10 South Asia

The latest of UNEP's regional sea programmes, the South Asian region includes Bangladesh, India, the Maldives, Pakistan and Sri Lanka. These include some of the most highly populated regions of the world, and coastal marine pollution is serious, with contributions from oil, sewage, food processing wastes, mine tailings, siltation and thermal effluents. Preliminary work on the documentation for a plan of action has been completed, and the plan is expected to be approved during 1988.

What next?

The world's oceans cover 70 percent of the planet's surface. Their health – or sickness– inevitably reflects the condition of the Earth itself. What more can be done to improve prospects for the patient?

UNEP has several major ocean-related goals. First, the Regional Seas Programme needs further attention: not all regions have reached the same level of self-sufficiency and efficiency, and more help may be needed in areas where progress has been slow. And there are still a few remaining areas that would benefit from a regional seas programme.

The second objective is to forge improved links between different regional programmes. In the Indian Ocean, for example, five regional programmes deal with the coastal problems of one ocean. Each could benefit more from the knowledge and experience of the others. If research and monitoring in the five areas could be integrated, scientists would have instant access to the information they need to assess the health of one of the world's major oceans.

If more such link-ups could be made, and a globally coordinated system set up, scientists could learn much more about the mutual interdependence of the regions, and of the influence that each region has on the global oceans.

What Stockholm said ...

Principle 7: "States shall take all possible steps to prevent pollution of the sea by substances that are liable to create hazards to human health, to harm living resources and man's life, to damage amenities or to interfere with other legitimate uses of the sea."

Recommendation 73: "that governments actively support, and contribute to, international programmes to acquire knowledge for the assessment of pollutant sources, pathways, exposures and risks."

Even so, bridging the gaps between the regional programmes, and then the gaps between the major oceans, will reveal relatively little about what is going on in the open ocean. So far, most marine pollution research has concentrated on the polluted coastal regions.

More attention will be focussed in the future on open ocean monitoring designed to increase our basic understanding of what is happening in the oceans, and of the fate of the pollutants that enter them.

However, open ocean monitoring is expensive; and there is, as yet, no real proof that it is urgently required. The open oceans still have a relatively clean bill of health. It would therefore be wrong to divert money from the urgent needs of the polluted coastal areas to the less pressing needs of the less polluted open ocean.

On the other hand, the world's atmosphere and fresh water systems are already extensively monitored; the open oceans are the remaining major gap in the world's monitoring system. That gap will have to be filled over the coming years because the health of the planet depends so critically on what is happening in its oceans.

To learn more ...

More detailed accounts of the issues discussed in this publication can be found in:

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Hulm, Peter. *A Strategy for the Seas*. UNEP, 1983.

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